

Remarks/Arguments

Claim 1 is amended herein by incorporating the subject matter of claim 18, now canceled, and by deleting the option where the "X" group in the recited chemical structure is -O-. Thus, claims 1, 6, 8-10, 13, 19-22, 24 and 30 remain pending and under examination in the application.

Applicant traverses the rejection of claims 1, 6, 8-10, 13, 18-22, 24 and 30 under 35 U.S.C. Section 102(b) as being anticipated by Speranza et al. (U.S. Pat. No. 5,093,382; "Speranza I"). Reconsideration and withdrawal of the rejection are respectfully requested in view of the following remarks.

As noted by the Examiner, the Speranza I reference does describe the reaction of 1 mole of Jeffamine® D-200 (a polyoxypropylene diamine) with 2 moles of trimellitic anhydride. However, the Examiner's conclusion that the reaction product obtained thereby has a structure within the scope of the above-referenced claims is incorrect. The reference does not expressly describe the reaction product structure. However, it is clear that the product actually obtained by such reaction contained imide groups. In contrast, Applicant's claims require that the polycarboxy-functionalized prepolymer not contain any imide groups.

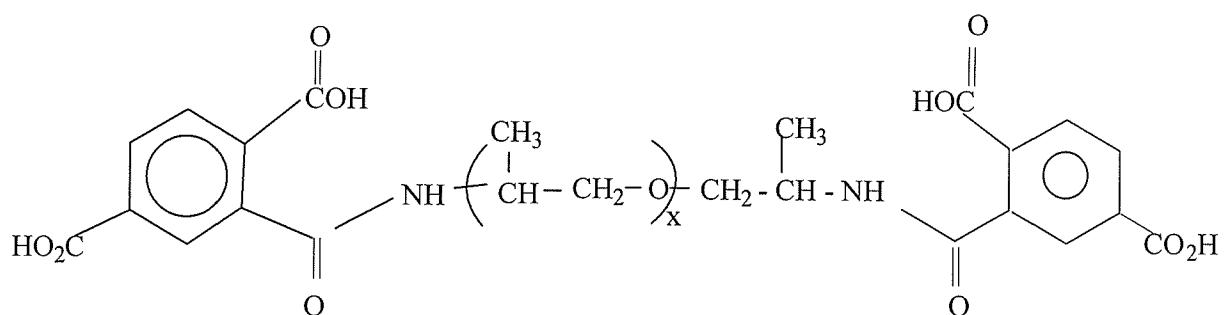
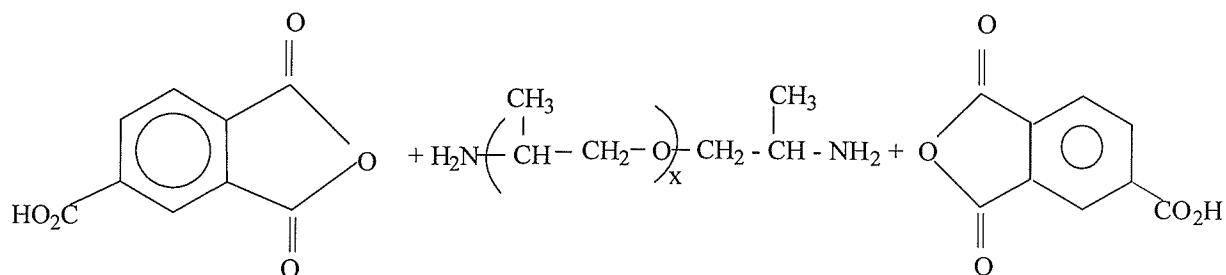
The Examiner's attention is respectfully directed to the description of Product F at Column 15, lines 43-44, of Speranza I, which is said to be obtained from Jeffamine® D-2000 and trimellitic anhydride reacted in a 1:2 molar ratio. The reference reports, in the table appearing at the top of Column 16, that Product F had an acid value of 0.803 meq/g. Such a relatively low acid value corresponds to a reaction product in which imide formation has taken place, not a reaction product where two of the three carboxylic acid groups associated with the trimellitic anhydride remain unreacted. Attached herewith is a Declaration pursuant to 37 U.S.C. Section 1.132 of Dr. Rainer Schoenfeld that explains in further detail the technical basis for these observations.

This key difference may perhaps be more readily understood by referring to the model reaction sequence below wherein two moles of trimellitic anhydride are reacted with one mole of an amino-terminated polypropylene glycol to obtain a polycarboxy-

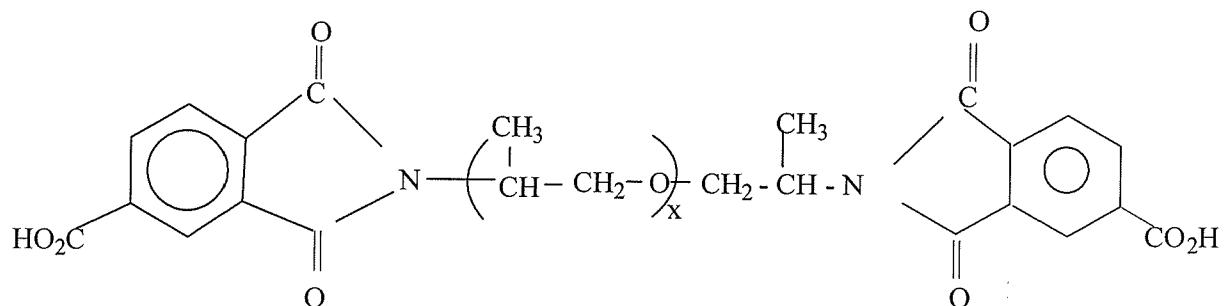
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functionalized prepolymer in accordance with Applicant's invention:



In the Speranza I reference, however, the reaction product obtained corresponds to the following structure containing imide groups:



Applicant traverses the rejection of claims 1, 6, 8-10, 13, 18-22, 24 and 30 under 35

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U.S.C. Section 103(a) as being unpatentable over Speranza et al. (U.S. Pat. No. 5,128,441; "Speranza II"). Reconsideration and withdrawal of the rejection are respectfully requested in view of the following remarks.

As noted by the Examiner, the Speranza II reference describes the preparation of an intermediate condensation product having terminal carboxyl groups by reacting a polyoxyalkylene diamine or triamine having terminal primary amine groups with an amount of a dicarboxylic acid or an anhydride or a C1 to C4 alkyl ester thereof, sufficient to react one mole of the dicarboxylic acid reactant with each terminal primary amine group of the polyoxyalkylene diamine or triamine.

The Examiner further notes that the reference suggests that trimellitic acid could be used as the "dicarboxylic acid" and that trimellitic acid should thus be considered equivalent to the adipic acid exemplified in the reference. However, trimellitic acid is, in fact, not equivalent to adipic acid since it is a tricarboxylic acid that has the potential to form an imide ring by reaction of the initially formed amide with an adjacent carboxylic acid group. Under the reaction conditions proposed by the Speranza II reference, which involve relatively high temperatures and the removal of water during the condensation reaction (see Column 5, lines 25-34), the substitution of trimellitic acid for adipic acid would result in an imide-containing reaction product having a single carboxylic acid group at each end of the molecule produced by such reaction. See the attached Declaration under 37 C.F.R. Section 1.132 of Dr. Rainer Schoenfeld attached herewith. Applicant's claimed invention, in contrast, relates to a product that does not contain imide groups but does have two or more carboxylic acid groups on at least one end of the product molecule. Referring to the structure set forth in Applicant's Claim 1, n has to be at least 1 and q has to be at least 2. Such a structure would not have been obvious to a worker of ordinary skill in the art from the disclosure of the Speranza II reference.

Applicant traverses the rejection of claims 1, 8-10, 13, 18-22 and 24 under 35 U.S.C. Section 103(a) as being unpatentable over Japanese Patent No. 4-89840. Reconsideration and withdrawal of the rejection are respectfully requested in view of the following remarks.

The abstract provided for Japanese Patent No. 4-89840 discloses "modified polyethylene glycol terminated with COOH" and indicates that such a substance is a reaction product of 6 parts poly(ethylene glycol) and 0.023 parts trimellitic anhydride. However, the abstract fails to disclose the molecular weight of the poly(ethylene glycol) and whether the stated "parts" of each reactant are "parts by weight" or are calculated on some other basis (equivalents or molar amounts, for example). The reaction conditions are also not given. As a result, a worker of ordinary skill in the art could not know what the molecular structure of the reaction product obtained actually was. In other words, such worker would be unable to determine whether the reaction product was a prepolymer (two molecules of the trimellitic anhydride reacted at each end of the poly(ethylene glycol) or a higher molecular weight polymeric material containing more than one repeating structural unit derived from the poly(ethylene glycol)). Additionally, the invention now being claimed by Applicant, as reflected in the claims currently under examination (which have been amended to exclude the embodiment where the "X" group in the chemical structure recited in Claim 1 is -O-) is directed to polycarboxy-functionalized prepolymers which can be derived from -SH and -NRH functionalized elastomeric polymers, not the -OH functionalized poly(ethylene glycol)s utilized in the Japanese Patent No. 4-89840 reference. A worker of ordinary skill in the art would not have found it obvious to change the functionality of one of the starting materials and to control the stoichiometry of the reactants and the conditions under which such reactants are combined so as to arrive at the specific polycarboxy-functionalized prepolymers containing -S- and -NR- groups that are recited in the currently pending claims.

Applicant traverses the rejection of claims 1, 9, 10, 18, 19, 21, 22 and 24 under 35 U.S.C. Section 103(a) as being unpatentable over Takahashi et al (U.S. Pat. No. 5,885,723) and Rieder et al. (U.S. Pat. No. 4,172,802). Reconsideration and withdrawal of the rejection are respectfully requested in view of the following remarks:

As noted by the Examiner, the Takahashi et al. reference discloses a carboxy-terminated polyalkylene glycol obtained by reacting a polyvalent carboxylic acid such as trimellitic acid and a polyalkylene glycol. The Rieder reference teaches carboxylic acid

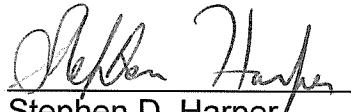
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group terminated diesters corresponding to the general formula set forth in Column 3, lines 3-18, of the reference. As noted above in connection with the Japanese Patent No. 4-89840 reference, however, the polycarboxy-functionalized prepolymers of Applicant's presently claimed invention contain thioester or amide linkages, not ester linkages. That is, the "X" group in the structural formula set forth in Claim 1 of the present application must be -S- or -NR-, not -O- as taught in the Takahashi et al. and Rieder references. It would not have been obvious to a worker of ordinary skill in the art to so modify the substances described in the prior art references relied on by the Examiner. This is particularly true in the case where "X" is a -NH- group, since under the reaction conditions described in these references imide-containing reaction products would have been obtained.

In view of the above discussion, Applicant respectfully submits that the application is in condition for allowance and favorable consideration is requested.

Respectfully submitted,



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